grass valley
A BELDEN BRAND

Datasheet

Rio

High-performance Online Editing, Color and Finishing for HD, 4K UHD, 4K DCI and 8K UHD

Rio delivers stunning images at any and every resolution, color space and framerate — whatever today's rapidly changing industry throws at it. Rio has the power to handle the whole job interactively through its comprehensive online editing, color correction and finishing toolset.

Whatever the job, Rio blends quality and creativity in a package that delivers the productivity needed to succeed in movie and TV finishing, getting the whole job done efficiently and without creative limits.

Performance

Rio delivers the ultimate productive post workflow. Thanks to its real-time performance, its complete, integrated toolset that keeps the whole job in the suite, and full integration into today's file-based workflows, Rio can handle everything you require from a finishing system — interactively and in realtime, making it the natural choice for client-attended sessions.

To achieve this performance, Rio runs on enterprise PC hardware that exploits the latest NVIDIA Maximus multiGPU technology to deliver interactive, real-time performance, even at 8K 60p.

Quality

With native colorspaces stored on disk, Rio handles Wide Color Gamut (WCG) and High Dynamic Range (HDR) grading utilizing a range of transfer curves. Its 32-bit full-float processing provides the best quality results with the highest precision color reproduction output in a range of colorspaces, including REC 2020, ACES, DCI-P3 and REC 709.

Choice

Rio is available in a choice of two turnkey configurations:

- Rio 4K – unmatched power and capability for high-end TV (UHD) and movie finishing (DCI)
- Rio 8K – the world's only real-time 8K 60p color and finishing system

For those preferring to build their own hardware platform, there are two software-only options:

- Rio – ideal for TV program and commercial finishing
- Rio 4K software – all the tools for 4K color and finishing for UHD and DCI

Open

Rio supports a wide range of data formats alongside wide color gamut and HDR. These include: OpenEXR, RED HDRx, Apple ProRes 422, Sony F55/65, Arri RAW, Canon, Phantom, Silicon Image, Blackmagic Cinema DNG, Sony XAVC and GoPro.

Powerful Primaries

Rio's wide range of primary color correction tools gives colorists the freedom to work the way they like. Primary tools include control of hue, saturation, lift, gamma and gain, with master and individual channel controls. Rio's S-curve pivot point function gives precision control over the critical toe and shoulder ends of the gray scale, enabling the colorist to give definition to shadow areas while rolling off the brighter areas to give a classic filmic look. RGB and Density Printer Light controls are complemented by editable curves working in RGB, YUV or HSL for complete color control; all this in any color space.

KEY FEATURES

- With HDR and wide color gamut features, brand new interface, enhanced Avid integration and super accurate cloud tracker, Rio provides the complete color and finishing system
- Rio delivers the ultimate productive post workflow
- The Neo panel provides natural heads-up control of color and seamless interaction with Rio's comprehensive grade management facilities
- Rio has real-time performance, a complete color and finishing toolset and full integration into today's file-based workflows
- Rio delivers stunning images at any and every resolution color space and framerate
- Rio offers a range of systems that takes advantage of the latest PC hardware to provide new levels of interactivity and openness
- Rio systems match the formats you work in today, as well as advanced formats for tomorrow
- Secondary controls include unlimited cascaded secondary color correction
- Dolby Vision support for Rio 4K
- New Grass Valley lossless compression codec — choose to run Rio uncompressed or compressed from 2:1 to 6:1 compression

Rio has all the tools you need to create with color. There are no limits with Rio; wide color gamut, HDR, multiple transfer curves are all supported. 32-bit float processing provides ultimate color precision. Primary color corrections can be combined with unlimited cascaded secondaries and unlimited shapes, all in-context across the multilayer timeline. Everything remains live for further enhancement.

Unlimited Secondaries

Secondary controls include unlimited cascaded secondary color correction, HSL vector selective with control of High and Low Softness for hue, saturation and luminance, giving high-precision results. The Revolver HSL-based secondary color corrector adds multiple simultaneous "in-picture" modifications.

There are graphic one-shot and freehand tools for selection and isolation of secondaries within the image, with controls to grow, shrink or blur the selected area. Different keys can be applied on every cascade using the auxiliary clip function.

Blend modes can be used between cascades to create more subtle looks; this also provides an opacity control between cascades. Rio's Range control is a very powerful addition to the toolset that gives absolute precision and subtlety in selective color control. It allows the low, mid and high ranges for the individual color controls to be precisely defined. Using the range graphs, it's possible to adjust exactly how each control will affect the image, including the tensioning and slope for each curve. Range-based saturation controls provide even more precision. Ever ything is easily accessed from the Neo panels. The range controls complement Rio's Dmin/Dmax controls.

Shapes

Using Rio's shapes and HSL keyer in combination, the colorist can define highly selective treatments of specific areas within the frame — and can grade both inside and outside the shape within a single cascade. The colorist can choose from preset graphical shapes or hand draw them for ultimate accuracy. Full softness control is available inside and outside the shape using Rio's Matinee tool. Any plugin can be applied to any cascade and used inside or outside any shape or key. Rio's versatile point tracker or the integrated Mocha tracker and flexible shapes tools makes color correcting moving-image elements simple and quick.

ACES Support

Rio supports The Academy Color Encoding Specification (ACES) and fully integrates into ACES pipelines, delivering a standard, future-proof color space.

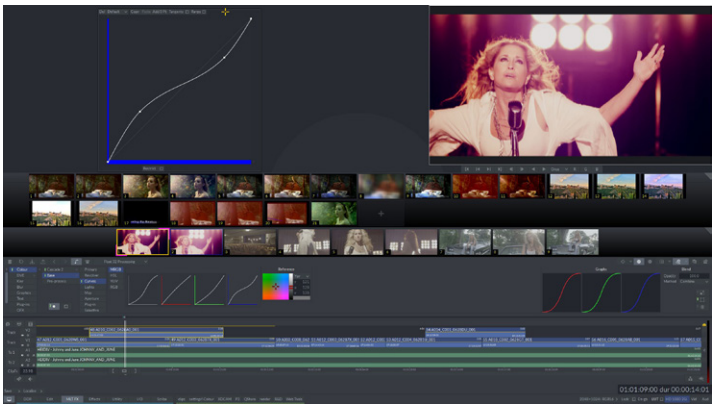
Dolby Vision Support

Rio 4K incorporates support for Dolby Vision using a Dolby CMU box. This allows for multiple HDR/SDR deliverables within a single package, analysis choices and trim functions mapped to the Neo panel.

Production Compression Codec

Choose to run Rio 4K and Rio 8K uncompressed or anything from 2:1 to 6:1 compression. Once compressed onto disk, the codec is lossless across multiple renders. This means you can get more media onto your existing storage at the same ratios as the compression chosen.

This is a brand new production compression codec from Grass Valley. It was originally based on VC2/Dirac with significant additional technology added by Grass Valley engineering.



Color UI featuring custom curves and storyboard

The Neo panel is individually configurable for multiple users

Rio's comprehensive editing and finishing toolset has everything you need to deliver the entire job, whether working with native colorspace on disk, grading in HDR or outputting multiple versions in mixed color-spaces — all from the same timeline.

Rio is your complete digital partner, handling RED, ARRI, SI, Sony, Panasonic, Blackmagic and Canon digital media in a highly efficient workflow while maintaining ultimate image quality at 4K and beyond.

Groups and Storyboards

Rio's Groups function is a great timesaver; it allows a grade to be automatically applied across a group of shots selected within a timeline. This includes grouping based on rush ID (multiple shots that have come from the same source rush), source timecode or a manual selection, allowing color settings to be applied on an individual cascade basis. The result is faster client-attended operation with even more flexibility. The Storyboard facility allows a grade from any shot to be instantly applied to any other — not just within one job, but across multiple projects. For example, Episodes 2 and 3 of a TV series can quickly be referenced against the first episode to provide consistency of look — all at the lightning-fast speeds you'd expect from Grass Valley.

Stereo3D Color Correction

Rio's autobalance tool fixes the inevitable left/right eye differences from the shoot prior to color correction. The Rio Stereo3D tools then enable each eye to be color corrected independently or together. Rio also includes full disparity control of shapes, making it easy to color correct in stereo.

Aperture Correction

Rio's aperture correction tool enables variable sharpening and defocusing on a per-cascade basis with just a single control. Aperture correction can also be applied to separate RGB channels.

Integrated Plug-ins

Plug-ins can be integrated into the color process, and be used within shapes and keys on a per-cascade basis — for example, to produce a specialized defocus or filters inside or outside a shape.

Choice of Panel

There is a choice of two control panels — Neo and its compact counterpart, Neo Nano. Both provide natural heads-up control of color and seamless interaction with Rio's comprehensive grade management facilities. Both are a great way to access the power of Rio.

Rio also offers third-party panel support for Tangents Elements, Ripple and an iPad app.

Simple to use Timeline Editor

Whether dropping in late-arriving effects shots, trying a different-length dissolve or putting together a complete promo or trailer, Rio has all the 2D and Stereo3D editing tools to make editorial changes easy.

Stereo3D Fixing and Finishing

Geofix2 performs precision geometry correction, quickly producing easy-to-watch Stereo3D. Interactive depth balancing makes handing-off over-edits straight forward. Deliverables for different-sized screens are easily produced using the floating-window tools.

Stereo3D Multilayer Timeline

Rio's Stereo3D multilayer timeline makes editorial and effects work in Stereo3D every bit as fast as working in 2D.

Integrated Mocha Tracker

The versatile Mocha planar tracker is fully integrated into the Rio toolset, alongside Grass Valley's own point-based tracker. Using Mocha, the artist simply draws a shape around the area to be tracked and Mocha does the rest.

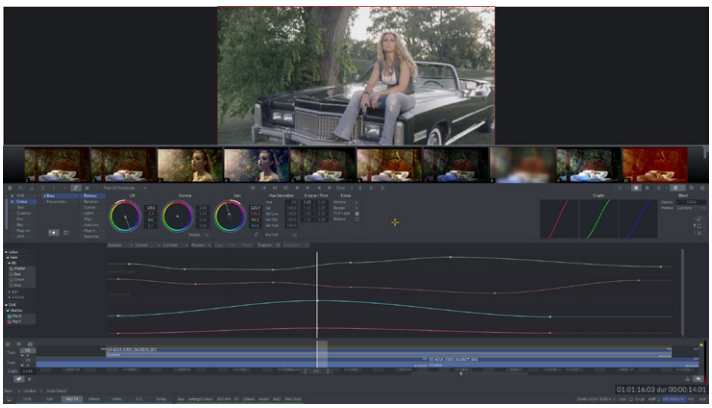
Conform

Rio gives you all the tools you need for video and file conforms including Avid effects. Conforms can be accomplished from either AAFs or EDLs and with both video and file-based media — MXF, DNxHD, RED, DPX, Cineon, Tiff, ARRI RAW, QuickTime and many others are supported.

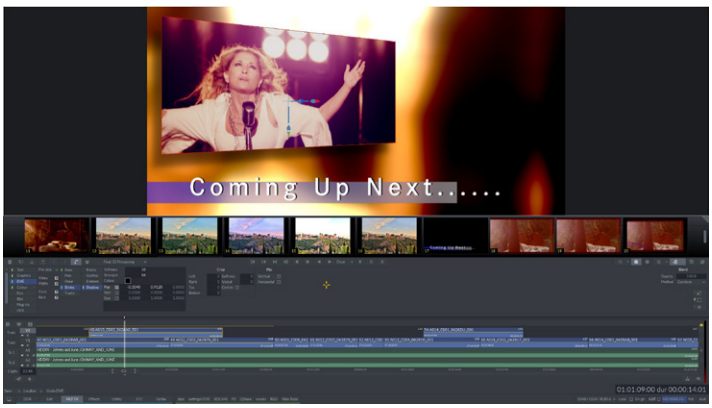
The conform menu includes powerful tools for applying settings from existing clips to new media such as VFX shots, making it quick and easy to handle late changes.

Effects and Compositing

Rio's integrated effects and compositing tools give the finishing artist an amazing array of choices for fixes — and the client more creative options — even at the final stages of a project. Never has it been easier to remove distracting items from a shot, replace a sky or even re-frame a whole sequence — right there in front of the client.



Rio includes comprehensive key-framing facilities



The Rio toolset delivers much more than color correction

The Neo Nano Panel — Smaller footprint with12 full-color OLED displays, and the same electroluminescent buttons, Neo Nano offers identical core primary and secondary grading options, user-definable presets and interactive visual feedback to the full-sized Neo Panel in a much more compact size.

The Neo panel — the ultimate control surface for colorists

The Neo and Neo Nano panels provide the ultimate in color-correction control. Their simple and uncluttered layouts give fast access to Rio's comprehensive grading toolset. The all-in-one design looks great in your grading suite, with the OLED displays and EL-illuminated buttons allowing you to find all your functions and presets, settings and controls at a glance.

Both the Neo and Neo Nano are fully customizable, right down to the brightness of the displays and the sensitivity of the controls. The Neo panel can even be configured for left- or right-handed use by swapping over the secondary and transport control panels.

Titling

Rio's on-board tools make it easy to add titles — whether lower-thirds in documentaries or complete subtitles for foreign language versions. Just another feature in the Rio armory that smooths workflow and gives clients more of what they need.

Audio

Rio brings up to 32-channel audio with sophisticated tools right into the color correction suite. With Rio, clients can review their movie at full resolution in real time — not only with instant nonlinear access to any shot or sequence, but also with 5.1 audio to complete the experience.

Respeeds

Comprehensive retiming tools, from optical flow motion through to using the world-renowned Grass Valley Alchemist technology for the ultimate in smooth motion respeed algorithms.

Retouch

Being a Grass Valley system, Rio has the legendary Paintbox built in. Paintbox is nothing short of brilliant for quick fixes — repairs, replacements, retouches, embellishments. All are completed seamlessly in seconds. Paintbox has rescued more shots than can be easily imagined — it is a huge time, money and face saver. Quite simply, nothing else comes close.

Versioning

Rio excels at producing the multitude of different deliverables that every movie now requires from the master — SD and HD for playout, airline versions, director's cut, different editorial versions for international distribution and the "making of" for the Blu-ray disc. Re-sizing, reframing, 3D LUTs and pan-and-scan are all handled on-the-fly in real time on output. More convenient for the client; more revenue for the Rio owner.

Integrated DCP toolset

Grass Valley has integrated the widely-used Fraunhofer DCP API into the Rio toolset. This enables the creation of standards-compliant DCP encrypted masters for delivery, and the importing of DCP files into the Rio environment, facilitating their use as a high quality interchange format. Working with the Fraunhofer DCP toolset within the Rio environment saves time and costs associated with exporting media to external systems. Better still, creative work can continue uninterrupted on Rio while DCP packages are being created as a background task.

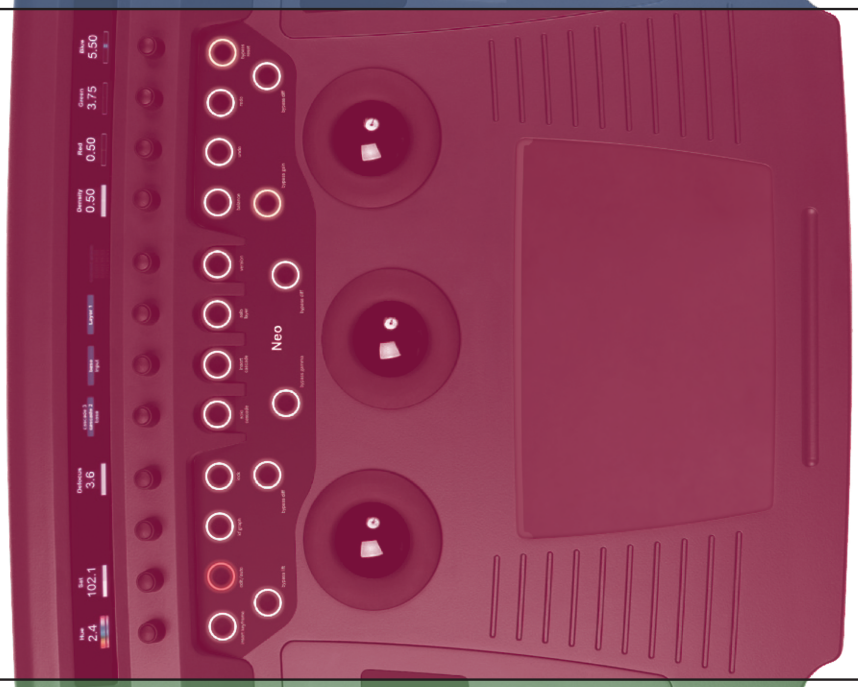
Transport controls

USB port for user customizable profiles for all control settings and sensitivity.

Grade management for still store and storyboard, with grade grouping and trim management.

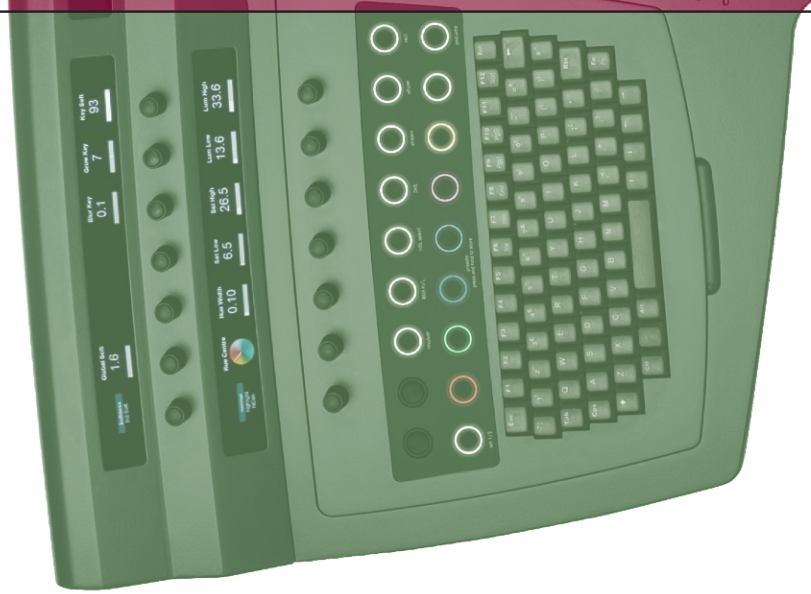
Transport controls with still store, reference frame control, plus left and right glide pads — eliminating the need for a mouse.

Primary grading area



Primary grading area with high-mass track balls and built-in digitizing tablet for drawing complex shapes, retouching, etc.

Secondary grading area



Secondary grading area access to all the secondary correction and isolation tools, DVE, and banks of preset effects. Full keyboard speeds text entry for grade management.

40 full-color OLEDs associated with controls — interactive visual feedback on current selections.

Electroluminescent displays backlit legend makes controls easy to find in a darkened suite.

Rio's blistering performance is underpinned by the latest computer hardware.

Rio turnkey systems provide guaranteed out-of-the-box performance running on cutting-edge PC hardware. They are available in a wide range of configurations to allow customers to tailor the system to their specific needs. Rio Turnkey systems are supplied fully assembled, configured and tested to provide the ultimate in performance and are supported by Grass Valley 24/7 worldwide.

NVIDIA Maximus

Rio takes advantage of NVIDIA Maximus technology. NVIDIA Maximus enables multiple GPUs to work together in the same system. Rio uses Tesla GPUs with 4992 CUDA cores capable of delivering 8.74 teraFLOPS. This power is simultaneously applied to processing-intensive color and finishing operations in Rio, handling most tasks in real time. The result is blistering performance that brings a new level of interactivity to the color and finishing suite.

The Rio 4K and Rio 8K turnkey system utilize the following GPUs:

- Rio 4K provides support for up to 1 or 2 Tesla P100 GPUs
- Rio 8K supports 3 Nvidia Tesla P100 for image processing and 1 Nvidia Quadro K620 card for UI display

With its complete color and finishing toolset and blistering performance, Rio is the natural choice to sit at the heart of your data-centric post pipeline.

Soft Mount

With soft mount support for RED, OpenEXR, DNxHD, MXF, SStP, F55/65, XAVC, Arri RAW, Canon RAW, GoProMP4, Blackmagic Cinema DNG, Apple ProRes 422, DPX, Cineon, Tiff, P2, XDCAM and RED Epic, there is no need to import media into local workspace with Rio. Work can start immediately wherever the material is stored, whether on a USB drive, SAN or NAS. Rio Archives can also be soft mounted.

Render on Export

There's no requirement to render media to local storage with Rio. When the job is complete, it is simply rendered as it is exported to the facility SAN or NAS, saving time and disk space.

Teamworking with Rio

Teamworking with Rio is easy thanks to soft mount. With source media stored on the facility storage, all Rio systems can see the same source files. Project files (local archives) can be quickly saved and soft mounted by other systems. These archives point at the source rushes so jobs can be quickly accessed and shared between suites.

Rio Connect — better workflows; more productive post

The Rio Connect collaborative workflow engine instantly solves facility scheduling challenges by enabling media sharing between up to eight Rio systems. With Rio Connect, time consuming media transfers and copying are eliminated at a stroke.

Every Rio suite can work on the same job, or projects can be instantly moved between suites; Rio Connect enables you to maximize your productivity and revenues.

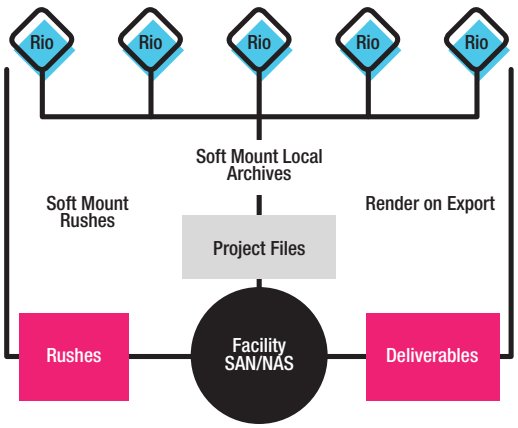
- Complete flexibility to move jobs at a moment's notice – take on short-notice work
- Teamwork across multiple suites instantly – take on jobs with tight deadlines
- Handle late changes with ease – happy clients return time and again
- Instantly review the state of a distributed project – stay in control

Rio Software

Rio as a software-only solution is available as a low-cost assistant tool for preparation, conform and pre-vis for file-based editorial, online finishing and color correction. Rio software has a powerful toolset that handles all your backroom jobs quickly and efficiently, enabling your customer-attended Rio sessions to be even more productive.

Rio software is CUDA-enabled, maximizing the performance of your chosen hardware platform. It supports up to 2K (including all HD resolutions) video output and naturally includes rich metadata compatibility with Rio.

- Advanced color tools and 3D LUT color management – create offline looks fast and efficiently
- Optional Neo Nano control panel – intuitive, interactive working
- File-based conform engine with multilayer timeline editing interface
- High quality debayering and transcoding
- Supports all popular RAW formats – optimized workflows for digital capture systems



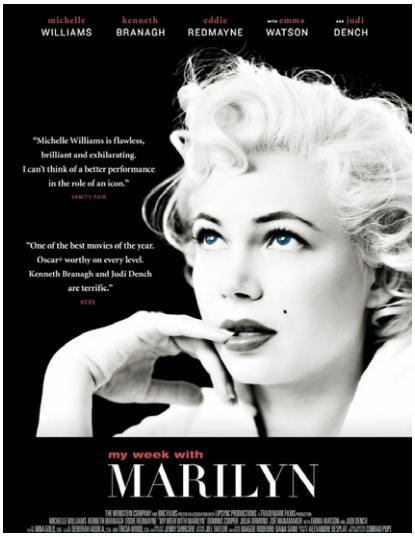
The Rio Portfolio

Interstellar, Avatar, The Girl with the Dragon Tattoo, Hugo, Gone Girl, My Week with Marilyn — just a few of the thousands of movies in which Rio has played a central role. Rio's TV credit list is equally impressive, from *Desperate Romantics* to *Birdsong*.

Along the way, Rio has time and again broken new ground: truly interactive working at high resolution; the world's first viable Stereo3D toolset; embracing file-based capture and workflows; and integrating a complete editing and finishing toolset alongside color correction so that jobs speed through the suite whatever the challenge.

Rio's outstanding success is no accident. It was designed with the help of top colorists, and their vision realized with unique technologies and thinking. The result is the most powerful, capable and precise color correction and finishing environment on the planet.

With Rio, client-attended sessions have become an interactive, creative experience, while the integrated finishing toolset gets the whole job done more quickly and more efficiently.



SPECIFICATIONS

	Benefit	Rio Software		Rio Turnkey	
		Rio	Rio 4K	Rio 4K	Rio 8K
Color					
Full range of color tools	Complete creative color control	•	•	•	•
Unlimited secondaries	Total color flexibility	•	•	•	•
Unlimited shapes	Total color flexibility	•	•	•	•
Unlimited still store	Save time by having all reference frames online	•	•	•	•
3D burn-in, import and output LUTs	Use 65x65x65 cubes to set a look on import or prior to color correction. Real-time output luts	•	•	•	•
HDR Grading	Grade for High Dynamic Range	•	•	•	•
Store native colorspace on disk	REC2020, P3, ACES, Hybrid Log Gamma...	•	•	•	•
32-bit float linear processing	Highest quality results for both video and data	•	•	•	•
Neo/Neo Nano panel	The best color panel ergonomics available. All tools available at a single button press	o	o	o	o
Toolset					
Timeline editing	Make last minute changes easily	•	•	•	•
16-track audio	Comprehensive editing facilities	•	•	•	•
32-channel audio	Support for multichannel audio	—	—	—	•
Conform	Comprehensive conform tools for both file and tape-based media	•	•	•	•
MLTFX	Save time and money by interactively finishing shots directly on the timeline with Keyer, DVE, Blur, Text, Tracker and Graphics tools.	•	•	•	•
Stereo 3D toolset	Fix, perfect and deliver stereo 3D content	•	•	•	•
Effects toolset (incl. paint)	Paint tools	Paint only	•	•	•
Utilities	Add/remove 3:2 plus other time-based functions	•	•	•	•
Scribe	Create and edit rolls and crawls quickly & easily	•	•	•	•
I/O and playback					
Dual monitor support	Organize clips and bins on your desktop	—	•	•	•
SD, HD and 2K output	Video out up to 2K	•	•	•	•
SD, HD and 2K input	Video in up to 2K	—	•	•	•
4K output	Handle highest quality 4K jobs	—	•	•	•
4K input	4K input support	—	•	•	•
8K output	16x 3G SDIs for 8K output	—	—	—	•
8K input	8K input support	—	—	—	•
Real-time 4K 16-bit playback	Reliably view and deliver every frame	—	•	•	•
Real-time 8K 16-bit playback	Reliably view and deliver every frame	—	—	—	•
4K HFR 60 fps support	Reliably view and deliver every frame up to 60 fps	—	•	•	•
8K HFR 60 fps support	Reliably view and deliver every frame up to 60 fps	—	—	—	•
Real-time pan and scan	Make different format deliverables quickly while maximizing storage efficiency	•	•	•	•
16-channel audio I/O	Audio input and output supported	—	•	•	•
32-channel audio I/O	Interface to alternative formats	—	—	—	•
VTR serial control	Control VTR decks	—	•	•	•
Deliver to sQ	Get content to air quickly	—	o	o	o
Processing					
GPU (CUDA) processing	Fast and upgradable for unbeatable creativity and throughput	•	•	•	•
Multiple GPU support	Configure a system to match your needs	—	•	•	•

Key: • Standard o Option — Not Available

SPECIFICATIONS (CONT.)

Rio 4K Turnkey System Specifications

Supermicro Superserver 7048GR-TR

2x Intel Xeon E5-2687W v3 (with suitable heatsinks):
- 3.10 GHz
- 10 cores/20 thread
- 256 kb L2 cache – per core
- 25 Mb L3 cache – shared between all cores
- 4 channel memory controller
- Two 9.6 Gb/s QPI links

64 GB RAM:
- 8x 8 Gb 2133 MHz REC ECC DDR4 DIMMs
- (Configured to obtain maximum memory bandwidth)

2x Toshiba 240 Gb SSDs (System/Data Drive):
- Toshiba THNSJ240PCSZ
- 240 Gb
- SATA3 (6 Gb/s)
- Configured as a RAID-1 array

2x Toshiba 480 Gb SSDs (Audio Drive)
- Toshiba THNSJ480PCSZ
- 480 Gb
- SATA3 (6 Gb/s)
- Configured as a RAID-1 array

1x NVIDIA Tesla P100 12 GB (GPU processor) image processing

1x NVIDIA Quadro K620 (used as display card)

1x DVD-RW Drive – Optairic AD7260S (or equivalent)

5x USB 3.0 ports (x2 front, x2 rear, x1 internal)

4x USB 2.0 ports (x2 internal, x2 rear)

2x RS-422 VTR control (serial interface card supplied uses x1 internal USB 2 port)

Dual redundant 2 kW PSUs

Supermicro mobile rack

Keyboard and mouse

Thunderbolt Support (add-on card required, tested – works with the AJA SDI boxes)

Wacom Intuos 5 tablet and pen (as configuration options below)

	No Panel	Neo Nano Panel	Neo Panel
Large Tablet	✓	x	x
Small Tablet	x	✓	x
No Tablet	x	x	✓

VTR Serial Interface

2x RS-422 9-pin VTR serial interface ports are provided on the rear of the machine

Standard Video and Audio Interfaces

4x multiformat 3G/HDSDI/SDI 10-bit outputs/inputs with up to 32 channels of embedded audio
- Inputs auto sense any supported format

32 channel audio is embedded via SDI 1 and SDI 2 (16 channels each)

Storage

As standard, a Rio 4K turnkey system ships with a single external SAS array with 24x Seagate 10,000 rpm 1.8 TB disks configured as dual 10+2 parity disk arrays

Data is striped across both 12-disc arrays for maximum performance (RAID-60)

Delivering 2 GB/s read and 1.7 GB/s write

Up to 6 arrays in total can be added to the system

AJA Kona 4 Support

The AJA Kona 4 connectors for use in Rio 4K are configured as shown below.

AJA Kona 4 Supported Output Formats – Mono

Mono	FPS	SDI 1	SDI 2	SDI 3	SDI 4	Output Link Selection (default)
SD YUV 422 (576/486)	25, 29.97			1.5G		Single
HD YUV 422	23.98, 24, 25, 29.97, 30			1.5G		Single
HD/2K RGB 444 Dual Link	23.98, 24, 25, 29.97, 30			1.5G	1.5G	Dual
HD/2K RGB 444 Level B	23.98, 24, 25, 29.97, 30			3G		Level B 3G
1080 (P) YUV 422 Level A	50, 59.94, 60			3G		Level A 3G
2K (P) YUV 422 Level A	47.95, 48, 50, 59.94, 60			3G		Level A 3G
720P YUV 422	50, 59.94, 60			1.5G		Single
Quad HD YUV 422 (UHD1)	23.98, 24, 25, 29.97, 30	1.5G	1.5G	1.5G	1.5G	Single
4K YUV 422	23.98, 24, 25, 29.97, 30	1.5G	1.5G	1.5G	1.5G	Single
Quad HD RGB 444 Level B	23.98, 24, 25, 29.97, 30	3G	3G	3G	3G	Level B 3G
4K RGB 444 Level B	23.98, 24, 25, 29.97, 30	3G	3G	3G	3G	Level B 3G
Quad HD YUV 422 (UHD1) Level A	50, 59.94, 60	3G	3G	3G	3G	Level A 3G
4K YUV 422 Level A	47.95, 48, 50, 59.94, 60	3G	3G	3G	3G	Level A 3G

HDMI Output is also supported and will be active at the same time. Optionally HDMI may downsize QHD and 4K for viewing on an HD monitor (using registry setting "HDMI DownSize QHD to HD").

AJA Kona 4 Supported Output Formats – Stereo3D

3D Stereo	FPS	SDI 1	SDI 2	SDI 3 (L)	SDI 4	Output Link Selection (default)
HD YUV 422	23.98, 24, 25, 29.97, 30			1.5G	1.5G	Single
HD/2K RGB 444 Level B	23.98, 24, 25, 29.97, 30			3G	3G	Level B 3G
720P YUV 422	50, 59.94, 60			1.5G	1.5G	Single
1080 (P) YUV 422 Level A	50, 59.94, 60			3G	3G	Level A 3G
2K (P) YUV 422 Level A	47.95, 48, 50, 59.94, 60			3G	3G	Level A 3G

Notes:

2K = 2048 x 1080, Quad HD = 3840 x 2160, 4K = 4096 x 2160

When selecting the output frame rate in the user interface the appropriate output link choices are provided in the selector menu.

Reference must be the same frame rate as the output in order to lock.

AJA Kona 4 Supported Input Formats

Mono	FPS	SDI 1	SDI 2	SDI 3	SDI 4
SD YUV 422 (576/486)	25, 29.97	1.5G			
HD YUV 422	23.98, 24, 25, 29.97, 30	1.5G			
HD RGB 444 Dual Link	23.98, 24, 25, 29.97, 30	1.5G	1.5G		
HD RGB 444 Level B	23.98, 24, 25, 29.97, 30	3G			
1080P YUV 422 Level A	47.95, 48, 50, 59.94, 60	3G			
720P YUV 422	50, 59.94, 60	1.5G			

AJA Kona 4 Supported Input Formats – Stereo 3D

3D Stereo	FPS	SDI 1 (L)	SDI 2	SDI 3	SDI 4
HD YUV 422	23.98, 24, 25, 29.97, 30	1.5G	1.5G		
HD/2K RGB 444 Level B	23.98, 24, 25, 29.97, 30	3G	3G		
720P YUV 422	50, 59.94, 60	1.5G	1.5G		
1080 (P) YUV 422 Level A	50, 59.94, 60	3G	3G		
2K (P) YUV 422 Level A	47.95, 48, 50, 59.94, 60	3G	3G		

AJA Corvid 88 Option (FGAQR 500410)

Additional Input Formats Supported

Mono	FPS	SDI 1	SDI 2	SDI 3	SDI 4
Quad HD YUV 422 (UHD1)	23.98, 24, 25, 29.97, 30	1.5G	1.5G	1.5G	1.5G
4K YUV 422	23.98, 24, 25, 29.97, 30	1.5G	1.5G	1.5G	1.5G
Quad HD RGB 444	23.98, 24, 25, 29.97, 30	3G	3G	3G	3G
Quad HD YUV 422 (UHD1)	50, 59.94, 60	3G	3G	3G	3G
4K YUV 422	50, 59.94, 60	3G	3G	3G	3G

Notes:

VPID – Vertical Payload Identifier needs to be present for the AJA Kona 4 to correctly detect the input standard.

SPECIFICATIONS (CONT.)

Rio 8K Turnkey System Specifications

4U Mainframe
Supermicro Superserver SYS-4028GR-TRT

CPU: 2x Intel Xeon E5-2687W v3 10 Core, 3.1 GHz, 25 MB L3 cache

RAM: 128 GB 8x 16 GB, DDR4, 2133 MHz, REG ECC

GPU: 3x Nvidia Tesla P100 for image processing
1x Nvidia Quadro K620 card for UI display

Disks: 2x 240 GB SSD in RAID-1 for system
2x 480 GB SSD in RAID-1 for audio storage
3x SAS RAID controllers (for video workspace)

4 x rear panel USB3 ports

Dual 10 Gb Ethernet (10G Base-T Copper)

2x RS-422 VTR Control

Quad 1600W PSUs – system will operate with only 2 PSUs

Rackmount kit

Keyboard and mouse

Wacom Intuos 5 tablet and pen (as configuration options below)

	No Panel	Neo Nano Panel	Neo Panel
Large Tablet	✓	x	x
Small Tablet	x	✓	x
No Tablet	x	x	✓

Video Workspace

Rio 8K is supplied with 5.5 hours of storage at 7680x4320 10-bit 422 59.94 fps. Essence is stored uncompressed on the system

The storage comprises of three 2 RU arrays each with 24 1.8 TB 10,000 rpm SAS drives

Each array is configured as RAID-60 with 20 drives and 4 parity drives

Each array has dual PSUs

The arrays are connected via SAS to the Rio 8K mainframe

Rio 8K does not support 8K 60p record or play-back with a failed disk as the performance of the SAS RAID controllers drops by about 30% with a faulty disk present

No media is lost in the event of a disk failure and the system can continue to be used with one faulty drive although without real-time record or playback. The video data continues to be fully protected in the event that one drive fails per array.

Failed disks should be replaced when the system is not in operation as rebuilding the array further impacts performance and takes up to 6 hours

Expansion of the video workspace is possible by adding option 115 and/or option 117 taking it up a total of 18 arrays (6 wide and 3 deep), providing a total of 33 hrs of 7680x4320 @60p

Audio Storage

Audio is stored on a mirrored pair of 480 GB solid state disks in the Rio 8K mainframe

Audio is stored as uncompressed 48 kHz 24-bit per channel

The storage capacity for 32 channel audio is 20 hours

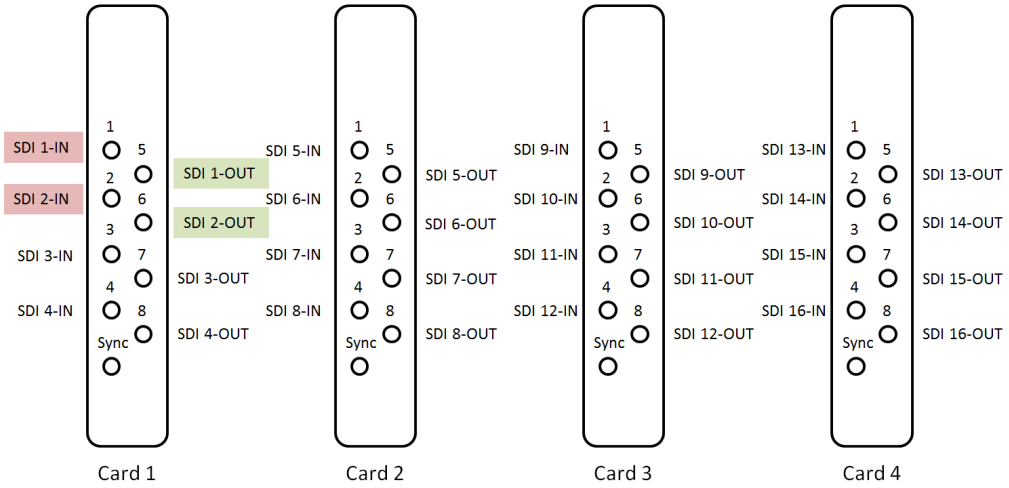
The audio data is stored on two disks in a RAID-1 mirror configuration so is protected in the event of a failure of either disk. However, unlike the video data the audio data is not protected if one of the audio drives has failed. To reduce the risk of losing any audio data the system should not be used with a failed audio drive – the failed drive should be replaced and the array rebuilt as soon as possible. Rebuilding the array takes up to 90 minutes.

Video and Audio Interfaces

Video and audio input/output is provided by four AJA Corvid 88 cards each with 8 3G SDI interfaces.

8K Input and Output

The 16 connections used for 8K 60p are allocated as follows:



The individual 3G SDI interfaces map to the 16 HD tiles of the 8K image as shown at right:

For 8k 60p operation Level A 3G SDI signals are supported

32 channels of embedded audio are supported on Rio 8K via SDI-1 and SDI-2 which each handle 16 channels of audio

SDI-1	SDI-2	SDI-5	SDI-6
SDI-3	SDI-4	SDI-7	SDI-8
SDI-9	SDI-10	SDI-13	SDI-14
SDI-11	SDI-12	SDI-15	SDI-16

Other Supported Output Formats – Mono

When working with output formats other than 8K, the user chooses which Corvid 88 card to use and the tables below describe how the 4 SDI outputs on the selected card are used.

Mono	FPS	SDI 1	SDI 2	SDI 3	SDI 4	Output Link Selection (default)
SD YUV 422 (576/486)	25, 29.97	1.5G				Single
HD YUV 422	23.98, 24, 25, 29.97, 30	1.5G				Single
HD/2K RGB 444 Dual Link	23.98, 24, 25, 29.97, 30	1.5G	1.5G			Dual
HD/2K RGB 444 Level B	23.98, 24, 25, 29.97, 30	3G				Level B 3G
1080 (P) YUV 422 Level A	50, 59.94, 60	3G				Level A 3G
2K (P) YUV 422 Level A	47.95, 48, 50, 59.94, 60	3G				Level A 3G
720P YUV 422	50, 59.94, 60	1.5G				Single
Quad HD YUV 422 (UHD1)	23.98, 24, 25, 29.97, 30	1.5G	1.5G	1.5G	1.5G	Single
4K YUV 422	23.98, 24, 25, 29.97, 30	1.5G	1.5G	1.5G	1.5G	Single
Quad HD RGB 444 Level B	23.98, 24, 25, 29.97, 30	3G	3G	3G	3G	Level B 3G
4K RGB 444 Level B	23.98, 24, 25, 29.97, 30	3G	3G	3G	3G	Level B 3G
Quad HD YUV 422 (UHD1) Level A	50, 59.94, 60	3G	3G	3G	3G	Level A 3G
4K YUV 422 Level A	47.95, 48, 50, 59.94, 60	3G	3G	3G	3G	Level A 3G

Notes:

2K = 2048x1080, Quad HD = 3840x2160, 4K = 4096x2160

When selecting the output frame rate in the user interface the appropriate output link choices are provided in the selector menu.

Reference must be the same frame rate as the output in order to lock.

32 channels of embedded audio are supported.

SPECIFICATIONS (CONT.)

Other Supported Input Formats

When working with output formats other than 8K, the user chooses which Corvid 88 card to use and the tables below describe how the 4 SDI inputs on the selected card are used.

Mono	FPS	SDI 1	SDI 2	SDI 3	SDI 4
SD YUV 422 (576/486)	25, 29.97	1.5G			
HD YUV 422	23.98, 24, 25, 29.97, 30	1.5G			
HD RGB 444 Dual Link	23.98, 24, 25, 29.97, 30	1.5G	1.5G		
HD RGB 444 Level B	23.98, 24, 25, 29.97, 30	3G			
1080P YUV 422 Level A or B	50, 59.94, 60	3G			
720P YUV 422	50, 59.94, 60	1.5G			
Quad HD YUV 422 (UHD1)	23.98, 24, 25, 29.97, 30	1.5G	1.5G	1.5G	1.5G
4K YUV 422	23.98, 24, 25, 29.97, 30	1.5G	1.5G	1.5G	1.5G
Quad HD RGB 444	23.98, 24, 25, 29.97, 30	3G	3G	3G	3G
Quad HD YUV 422 (UHD1)	50, 59.94, 60	3G	3G	3G	3G
4K YUV 422	50, 59.94, 60	3G	3G	3G	3G

Notes:

Quad HD = 3840x2160, 4K = 4096x2160.

VPID – Vertical Payload Identifier needs to be present for the AJA Corvid 88 to correctly detect the input standard.

3D Stereo input is not supported

32 Channels of embedded audio are supported.

Minimum requirements when installing a Rio 4K software:

Windows 7 64-bit Professional

2x Intel Xeon E5-2660W v3 (2.6 GHz, 25 MB cache, 10 cores, Intel vPro)

Minimum Base Clock Frequency: 2.6 GHz

Minimum Core Count (Per CPU): 8

64 GB RAM

Nvidia Quadro K620 – used for UI

Nvidia Tesla Kepler K40 or K80 GPU card – used for image processing to deliver real-time performance

Latest Quadro/Tesla driver version

Fast storage with a high bandwidth connection capable of delivering 2 GB/sec read and 1.7 GB/sec write

240 GB hard drive/SSD – system/data drives

480 GB hard drive/SSD – audio drive

Minimum Workspace

Rio 4K: 1x 36 TB SAS array 12 hrs 3840x2160 @ 25 fps

Rio 8K: 3x 36 TB SAS arrays 5.5 hrs 7680x4320 @ 60 fps

Maximum Workspace

Rio 4K: 6x 36 TB SAS arrays 72 hrs 3840x2160 @ 25 fps

Rio 8K: 18x 36 TB SAS arrays 33 hrs 7680x4320 @ 60 fps

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